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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/813,896	03/22/2001	Dharmendra Shantilal Modha	ARC9-2000-0078-US1	4276

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EXAMINER
LE, UYEN T

ART UNIT	PAPER NUMBER
2171	4

DATE MAILED: 03/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/813,896	MODHA ET AL.	
	Examiner	Art Unit	
	Uyen T Le	2171	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-26 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,3,4,6,7,13,15,16,18-20,22,23,25 and 26 is/are rejected.

7)☒ Claim(s) 2,5,8-12,14,17,21 and 24 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 17 May 2001 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Information Disclosure Statement

1. Applicant is reminded of the responsibility to provide a copy of each reference known by Applicant to be related to the claimed invention in an Information Disclosure Statement.

Applicant is kindly requested to submit a copy of each article referred to in the specification at pages 12, 25 in an Information Disclosure Statement.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "convex programming formulation" and the "objective function" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

The drawings are further objected to because it is not clear what feature Figures 2A, B, C, D illustrate. Note also that the vertical axis in Figure 2C, 2D are not labeled.

Specification

3. The disclosure is objected to because:

- it contains embedded hyperlinks and/or other forms of browser-executable code for example at pages 3, 23. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01
- it contains typographical errors and incomplete sentences for example at pages 5, 11, 12, 22
- it contains an exact duplicate paragraph at page 6

- it refers to the Figures as 1a, 1b... while the drawings shows 1A, 1B...
- it contains incomplete description for example "HEART (resp. ADULT) data", "macro-p". What do they represent and how important are they for applicant's invention? What do Q1, Q2, Q3 represent? What is the difference between Q1xQ2 and Q1xQ2xQ3?
- it contains many potential typographical errors in the mathematical expressions for example at pages 12, 15
- the "objective function" has not been defined
- the "convex programming formulation" has not been defined.

Applicant is requested to review the whole specification and make appropriate corrections.

Claim Objections

4. Claims 1-26 are objected to because of the following informalities:

- claims 1, 8, line 6, claims 13, 20, line 7, "vector" should be – vectors—
- claim 2, line 2, "said solution of a final clustering" should be – said final clustering solution—
- claim 2, line 2 "are" should be – is –
- claims 2, 8, last line "said feature spaces" should be – said heterogeneous feature spaces –
- the double quotation marks used to refer to the convex programming formulation and objective function should be removed.

Appropriate corrections are required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-26 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claims 1-26 recite a "convex programming" and an "objective function" as the main components for applicant's invention and place them in double quotation marks. Applicant seems to intend for those terms to have specific meaning. However, the specification does not contain any definition of those terms. The specification merely refers to those terms in double quotation marks.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention because:

- claims 1, 2, 5, 8, 10, 13, 14, 17, 20, 21, 24 contain terms in double quotation marks not explicitly defined in the specification.
- claim 5, lines 1-2 "said minimizing distortion of individual clusters" lacks antecedent basis
- claim 17, lines 1-2 "said instruction for minimizing" lacks antecedent basis

- claims 7, 12, last three lines are not understood. Therefore, the limitation can not be ascertained.

The art rejection of claims 1-26 is applied as best understood in light of the rejection under 35 U.S.C. 112, second paragraph discussed above.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 3, 4, 6,7, 13, 15, 16, 18-20, 22, 23, 25, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fayyad et al (US 6,115,708) provided by the applicant, in view of Ramakrishnan et al (US 5,596,719).

Regarding claim 1, Fayyad discloses a method for evaluating and outputting a final clustering solution for a plurality of multi-dimensional data records (see the abstract, Figures 2, 3). The claimed "defining a distortion...feature vectors" is met when Fayyad shows the distortion function (see column 7, line 47- column 8, line 10). The claimed "clustering ...formulation" merely reads on Figure 3 of Fayyad. Although Fayyad does not specifically show that a convex programming formulation is used, it is well known in the art as shown by Ramakrishnan to use convex programming to find optimum solutions (see the abstract, column 6, lines 43-46). Therefore, it would have been obvious to one of ordinary skill in the art to include the claimed convex

programming formulation and feature weights selection while implementing the method of Fayyad in order to take advantage of a well known optimization technique.

Regarding claim 3, Fayyad discloses applying a local minima when Fayyad shows the initial starting point (see the abstract).

Regarding claim 4, Fayyad discloses a k-means clustering algorithm (see column 5, line 31-column 8, line 33).

Regarding claim 6, although Fayyad does not specifically show analyzing word data and feature vectors comprising multiple-word frequencies of said data records, it is well known in the art to cluster documents using word frequency. Therefore, it would have been obvious to one of ordinary skill in the art to include the claimed feature while implementing the method of Fayyad depending on user's requirement.

Regarding claim 7, the claimed records having numerical and categorical attributes are met by the multidimensional data records of Fayyad (see the abstract). Clearly the clustering comprises analyzing data records as claimed.

Claims 13, 15, 16, 18, 19 and 20, 22, 23, 25, 26 correspond respectively to a system and computer program product for claims 1, 3, 4, 6, 7, thus are rejected for the same reasons stated in claims 1, 3, 4, 6, 7 above.

Allowable Subject Matter

8. Claims 8-12 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, first and second paragraphs, set forth in this Office action and to overcome the objection stated above.

9. Claims 2, 5, 14, 17, 21, 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and to overcome the rejection under 35 U.S.C. 112, first and second paragraphs and to overcome the objection as discussed above.

10. Since claim 8 includes all the limitations of claims 1 and 2, applicant is requested to cancel any duplicate claim that results from an amendment.

11. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record does not disclose or make obvious a method of clustering data records having multiple heterogeneous feature spaces represented by feature vectors by defining a distortion between two said feature vectors as a weighted sum of distortion measures on components of said feature vectors, clustering said data records using a convex programming formulation, selecting optimal feature weights by an objective function to produce a final solution of final clustering that simultaneously minimizes average intra-cluster dispersion and maximizes average inter-dispersion along all of said heterogeneous feature spaces including all the limitations recited in claim 8.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Wallet (US 6,363,327) teach extracting selected feature information and classifying heterogeneous regions of n-dimensional spatial data.

Bergman et al (US 6,529,916) teach multidimensional indexing structure for use with linear optimization queries.

Kassmann et al (US 6,381,505) teach robust steady-state target calculation for model predictive control.

Tokuyama (US 5,729,628) teaches image segmenting using an objective function.

Sato et al "Fuzzy clustering model for fuzzy data", IEEE 1995, pages 2123-2128.

Ben-Tal et al "Rate distortion theory with generalized information measures via convex programming duality", IEEE 1986, pages 630-641.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Uyen T Le whose telephone number is 703-305-4134. The examiner can normally be reached on M-F 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Safet Metjahic can be reached on 703-308-1436. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-7239 for regular communications and 703-746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Uyen Le
March 20, 2003